This listing of claims replaces all prior versions, and listings, of claims in this application.

Listing of Claims:

1. (Original) A decoding system for receiving and decoding data from an optical disk, comprising:

a demodulator for receiving and demodulating data from the disk to generate an ECC (Error Correction Code) block that comprises main data, a PI (Parity of Inner-code), and a PO(Parity of Outer-code);

a syndrome generator for generating a PI syndrome and a PO syndrome;

a memory that connects with said syndrome generator to store the data of said PO syndrome during said syndrome generator gencrating said PO syndrome;

a data buffer for storing said main data, said PI syndrome and said PO syndrome;

an ECC decoder for performing error correction decoding of said ECC block;

a de-scrambler and EDC (Error Detection Code) check for de-scrambling said main data stored in said data buffer and checking whether errors in said main data bcing corrected; and

an ATAPI (Advanced Technology Attachment Packet Interface) for reading said main data stored in said data buffer, thcn de-scrambling and transmitting said main data to the host.

2. (Original) The decoding system as claimed in claim 1 further comprising a data room that connects with said ECC decoder to store said PI syndrome and said PO syndrome.

3. (Original) The decoding system as claimed in claim 2 wherein said syndrome generator reads said ECC block from said demodulator, then transfers said main data to said data buffer; further said ECC decoder reads said PI syndrome and said PO syndrome from said data buffer to said data room to perform the error correction decoding, then corrects said PI syndrome and said PO syndrome in said data room and writes the corrected part of said main data into said data buffer.

4. (Original) The decoding system as claimed in claim 1 wherein said demodulator converts M bit code words into N bit data symbols (M>N).

5. (Currently Amended) A decoding method for receiving and decoding data from an optical disk, comprising the steps of:

(a) transmitting the data from the disk to a demodulator, wherein said demodulator demodulates the data to generate an ECC (Error Correction Code) block that comprises main data, a PI (Parity of Inner-code), and a PO (Parity of Outer-code);

(b) transmitting said ECC block to a syndrome generator and writing said main data into a data buffer;

(c) calculating a PI syndrome and a PO syndrome and storing the data of said PO syndrome to a memory during calculating said PO syndrome;

(d) writing said PI syndrome and said PO syndrome into said data buffer;

(e) reading said PI syndrome from said data buffer to an ECC decoder and transmitting said PI syndrome to a data room to perform the error correction decoding of the PI direction;

(f) correcting said PI syndrome in said data room, correcting said PO syndrome in said data buffer and writing the corrected part of said main data into said data buffer;

(g) writing said PO syndrome from said data buffer into said data room;

(h) reading said PO syndrome from said data room to said ECC decoder to perform the error correction decoding of the PO direction;

~~(g)~~ (i) correcting said PI syndrome and said PO syndrome stored in said data room, and writing the corrected part of said main data into said data buffer;

~~(h)~~ (j) reading said main data from said data buffer to a de-scrambler and EDC check to de-scramble said main data and check whether errors in said main data being corrected; and

~~(i)~~ (k) reading said main data from said data buffer to an ATAPI to de-scramble said main data and transmit to the host.

6. (Original) The decoding system as claimed in claim 5 wherein said demodulator converts M bit code words into N bit data symbols (M>N).

7. (Original) A decoding system for receiving and decoding data from an optical disk, comprising:

a demodulator for receiving and demodulating data from the disk to generate an ECC (Error Correction Code) block that comprises main data, a PI (Parity of Inner-code), and a PO (Parity of Outer-code);

a syndrome generator for generating a PI syndrome;

a data buffer for storing said main data, said PI syndrome and said PO;

an ECC decoder for performing the error correction decoding of said ECC block;

a de-scrambler and EDC (Error Detection Code) check for de-scrambling said main data storcd in said data buffcr and checking whether errors in said main data being corrected; and

an ATAPI (Advanced Technology Attachment Packet Interface) for reading said main data stored in said data buffer, de-scrambling and transmitting said main data to the host.

8. (Original) The decoding system as claimed in claim 7 further comprising a memory that connects with said ECC decoder to store a PO syndrome generated by said ECC decoder.

9. (Original) The decoding system as claimed in claim 8 wherein said syndrome generator reads said ECC block from said demodulator, then transfers said main data, said PO and said PI syndrome to said data buffer; further said ECC decoder reads said main data and said PO from said data buffer to calculate said PO syndrome and perform the error correction decoding of the PO direction, then writes said PO syndrome into said memory and corrects said PI syndrome in said data buffer and writes the corrected part of said main data into said data buffer, then reads said PI syndrome from said data buffer to perform the error correction of thc

PI direction, afterward corrects said PI syndrome in said data buffer and corrects said PO syndrome in said data room and writes the corrected part of said main data into said data buffer.

10. (Original) The decoding system as claimed in claim 7 wherein said demodulator converts M bit code words into N bit data symbols (M>N).

11. (Original) A decoding method for receiving and decoding data from an optical disk, comprising the steps of:

(a) transmitting the data from the disk to a demodulator, wherein said demodulator demodulates the data to generate an ECC (Error Correction Code) block that comprises main data, a PI (Parity of Inner-code), and a PO (Parity of Outer-code);

(b) transmitting said ECC block to a syndrome generator to calculate a PI syndrome;

(c) writing said PI syndrome, said main data and said PO into a data buffer;

(d) reading said main data and said PO from said data buffer to an ECC decoder to calculate a PO syndrome;

(e) writing said PO syndrome to a memory and performing the error correction decoding of the PO direction;

(f) correcting said PO syndrome in said memory, correcting said PI syndrome in said data buffer and writing the corrected part of said main data into said data buffer;

(g) reading said PI syndrome from said data buffer to said ECC decoder to perform the error correction decoding of the PI direction;

(h) correcting said PO syndrome in said memory, correcting said PI syndrome in said data buffer and writing the corrected part of said main data into said data buffer;

(i) reading said main data from said data buffer to a de-scrambler and EDC check to de-scramble said main data and to check whether errors in said main data being corrected; and

(j) reading said main data from said data buffer to an ATAPI to de-scramble said main data and transmit to the host.

12. (Original) The decoding system as claimed in claim 11 wherein said demodulator converts M bit code words into N bit data symbols (M>N).

13. (Original) A decoding system for receiving and decoding data from an optical disk, comprising:

a demodulator for receiving and demodulating data from the disk to generate an ECC (Error Correction Code) block that comprises main data, a PI (Parity of Inner-code), and a PO(Parity of Outer-code);

a syndrome generator for generating a PI syndrome;

a data buffer for storing said main data, said PI syndrome and said PO;

a first de-scrambler and EDC (Error Detection Code) check for de-scrambling said main data stored in said data buffer and checking whether errors in said main data being corrected;

an ECC decoder for performing the error correction decoding of said ECC block;

a memory that connects with said ECC decoder to store a PO syndrome;

a second dc-scrambler and EDC check for de-scrambling said main data which EDC checking is not finished yet and then checking again whether errors in said main data being corrected; and

an ATAPI (Advanced Technology Attachment Packet Interface) for reading said main data stored in said data buffer, then de-scrambling and transmitting said main data to tbe host.

14. (Original) The decoding system as claimed in claim 13 wherein said syndrome generator reads said ECC block from said demodulator, then generates said PI syndrome and transfers said main data, said PG and said PI syndrome to said data buffer, meanwhile said main data is also transferred to said first de-scrambler and EDC check.

15. (Original) The decoding system as claimed in claim 13 wherein said ECC decoder reads said PI syndrome from said data buffer to perform the error correction decoding of the PI direction, meanwhile transfers the error to said second de-scrambler and EDC check to get the EDC check of the PI direction, then corrects said PI syndrome and said PO in said data buffer and writes the corrected part of said main data into said data buffer, afterward said ECC decoder reads said main data and said PO from said data buffer to generate said PO syndrome and writes said PO syndrome into said memory to perform the error correction decoding of thc PO direction, then corrccts said PO syndrome in said memory and corrects said PI syndrome in said data buffer, meanwhile writes the corrected part of said main data into said data buffer.

16. (Original) The decoding system as claimed in claim 13 wherein said demodulator converts M bit code words into N bit data symbols (M>N).

17. (Original) A decoding method for receiving and decoding data from an optical disk, comprising the steps of:

(a) transmitting the data from the disk to a demodulator, wherein said demodulator demodulates the data to generate an ECC (Error Correction Code) block that comprises main data, a PI (Parity of Inner-code), and a PO (Parity of Outer-code);

(b) transmitting said ECC block to a syndrome generator to calculate a PI syndrome;

(c) writing said PI syndrome, said main data and said PO into a data buffer, and transmitting said main data to a first de-scrambler and EDC check to de-scramble said main data and check whether errors in said main data being corrected;

(d) reading said PI syndrome from said data buffer to an ECC decoder to perform the error correction decoding of the PI direction, and transmitting the error to a second de-scrambler and EDC check to get the EDG check of the PI direction;

(e) correcting said PI syndrome and said PO in said data buffer and writing the corrected part of said main data into said data buffer;

(f) reading said main data and said PO from said data buffer to said ECC decoder to calculate a PO syndrome;

(g) writing said PO syndrome into a memory to perform the error correction decoding of the PO direction;

(h) correcting said PO syndrome in said memory and correcting said PI syndrome in said data buffer, and writing the corrected part of said main data into said data buffer;

(i) reading said main data from said data buffer to a second de-scrambler and EDC check to de-scramble said main data which EDG checking is not finished yet and to check again whether errors in said main data being corrected; and

(j) reading said main data from said data buffer to an ATAPI to de-scramble said main data and transmit to the host.

18. (Original) The decoding system as claimed in claim 17 wherein said demodulator converts M bit code words into N bit data symbols (M>N).

19. (Original) The decoding system as claimed in claim 17 whercin said ECC decoder can be a RSPC (Reed Solomon Product Code) structure.

20. (Original) The decoding system as claimed in claim 17 wherein said data buffer and said memory include EDO-RAM, SRAM, DRAM, SL-DRAM, DR-DRAM, EDO-DRAM, SDRAM, DDR-SDRAM, VC-SDRAM, etc.